

**THE APPLICATION OF OCCUPATIONAL THERAPY IN CIVIL
LIFE TO CASES PRESENTING PARALYSIS, CONTRACTURE,
FIBROSIS, OR LACK OF COÖRDINATION.**

By JOHN H. ARNETT, M.D.,

PHILADELPHIA.

Introduction. The men who worked with Dr. Charles H. Frazier on the neurosurgical staffs of our army hospitals in Cape May and Staten Island had the opportunity to observe under favorable conditions over 1200 cases of peripheral nerve injury. We were able to compare the effect of rest and exercise of the injured part; to observe the relative value of active and passive motion; and finally to study the curative value of various types of active movement. Although toward the beginning there were conflicting ideas regarding the best method of treating extremities, paralyzed by peripheral nerve lesions, after observing these cases over months we concluded, practically unanimously, that the men who used their paralyzed limbs did better than those where rest was practised and that those who engaged in good hard work at home on the farm or in the occupational workshop of the hospital did better than those who only received massage and used their injured limbs but little. In consequence of these observations, occupational therapy was developed along certain new lines. Instead of looking upon it as a means of amusing and diverting the patients, a study was made to determine just which muscles and joints were brought into play by each occupation. An attempt was then made to assign each patient to the type of work best adapted to the treatment of his particular disability. In watching these developments we have been impressed with the possibilities for utilizing certain branches of occupational therapy in our civil hospitals in the treatment of peripheral nerve cases. What applies to the treatment of nerve injuries may also be true of many other groups of cases showing one or more of the phenomena which the former present, namely, paralysis, contracture, fibrosis or lack of coördination. This paper will deal with those phases of occupational therapy which were found to be of most value in our army experience and which seem most readily applicable to the treatment of the various forms of disability found in civil life.

The Application of Occupational Therapy. *Conditions under which it is Indicated.* The examiner should first assure himself of the presence of a lesion of such a character that improvement under occupational therapy might be expected. Next, that no condition exists which would contra-indicate the use of the disabled part.

Finally a decision should be reached as to which aspect of the patient's case should receive the first consideration.

Is pain a marked feature? If so, only one type of work is available until this condition improves, this being clay modelling.

Are fibrosis or undesirable contractures present? If so, treatment should next aim to correct these and wood-polishing would be indicated in the average case. It should be borne in mind, however, that some contractures are of benefit. In musculospiral paralysis, for example, treatment should not aim to overcome moderate contractures in the extensors, as this condition is desirable, since it assists in holding up the wrist and makes possible for the patient many compensatory movements.

Does paralysis alone exist? If complete paralysis in certain groups of muscles is present, work should be prescribed which would by the alternate contraction and relaxation of the muscles lying nearest to the paralyzed ones have the mechanical effect of increasing the flow of blood and lymph about the paralyzed muscles. This might be likened to massage of a diseased muscle by its healthy neighbor, and for this action, carpentry is probably of the greatest value.

Is recovery of function commencing? If so the work should aim to produce well-coördinated action in the newly innervated muscles. Typewriting was found to be quite valuable in this respect.

If recovery of function in certain muscle groups is improbable, treatment should be directed toward the development of compensatory movements. The mechanism of these substituted movements has been discussed in a previous paper.¹

Directions to the Patient. 1. Length and Character of Treatments. The character of the work, the length and time of the working period and the number of such periods during the day should be specifically stated in the directions to the patient. The length of the periods should not exceed five minutes at first. After a few days this can be gradually increased, but should never exceed an hour. The number of working periods prescribed in a day must depend upon the time the patient is willing to give to his work and the time given to other forms of treatment. About one-third of the patient's treatment time should be spent in occupational therapy.

2. Appliances. The patient should be instructed which tools and appliances are to be used and whether or not a splint is to be worn. Generally speaking, such appliances as the wrist-drop and the foot-drop splints, which are used to prevent overstretching, should be worn while working. Splints used to overcome deformity from contractures should be removed just before work is begun and reapplied the instant the work is finished, so that any gain which is made in overcoming the deformity may be held by the splint.

¹ Ingham and Arnett: Arch. Neurol. and Psych., February, 1920.

3. Position of the Patient. The exact position of the patient while at work should be specified. Here the general rule is to immobilize, as far as possible, all parts of the body proximal to the structures which are being treated. For example, in prescribing work to increase the mobility of the radio-ulnar joint the upper arm should be immobilized by grasping it from behind with the other hand.—Furthermore, some positions tend to overstretch the paralyzed muscles and should be avoided.



FIG. 1.—Shoulder extension is being measured. Modifications of this simple metrotherapy device may be used for other joints. Each week the reading is graphically charted and furnishes a quantitative record of the degree of motion attained.

4. Cautions. Patients with sensory loss are very liable to the occurrence of traumatic ulcers which are slow to heal and may interfere with all forms of treatment for weeks. In wood-polishing such patients should wear a suitable device to prevent blister formation, and whenever at work they should be under constant supervision.

5. Metrotherapy. Before treatment is begun the degree of both active and passive movement should be measured in one or more of the joints under treatment, and each week this measurement should be repeated. Simple measuring devices which are very satisfactory

can readily be constructed (Fig. 1). A graph showing the curve of recovery should be made, as this is of value in maintaining the patient's interest and showing how well the work is accomplishing its purpose. When the curve ceases to rise it means either that full mobilization has been secured or that this form of treatment is unsuccessful. In either case the therapy should be changed.

Contra-indications to Occupational Therapy. Where an unhealed wound or infection exists, obviously rest is required. Likewise, following nerve suture, ample time must be allowed for the down-growing axis-cylinders to bridge the gap and become firmly implanted in the distal nerve segment, before the part can be used. Finally in patients with sensory lesions, certain occupations, such as tin work are contra-indicated because of the danger of cutting or burning the hands.

Forms of Occupational Therapy. For Pain. In painful lesions involving the upper extremity, clay modelling is the occupation *par excellence*. The clay should be kept at about 100° F., and should be of mushy consistency where pain is great. Movements during the very painful stage should be largely passive in nature, the painful hand being immersed in clay and moved by the other hand. Later, clay of harder consistency may be moulded by rolling and twisting movements. Finally monolith beads may be rolled or pottery made. Clay modelling is valuable not only where pain is the chief factor in the case but also where extensive paralysis is present without fibrosis. Here this form of occupational therapy is resorted to simply because the patient is unable to move his fingers sufficiently to do anything else.

For Fibrosis. Where fibrosis or contractures exist without marked pain, oft-repeated movements of the affected joints are indicated.

1. Wrist or Finger-joints Involved. Where the finger- or wrist-joints are deformed, wood-polishing is most satisfactory. Where the deformity is one of flexion the holder shown in Figs. 2 and 3 should be worn upon the palmar surface of the hand. By wearing the same appliance upon the dorsal surface of the hand, deformities of extension may likewise be treated. After a few hours' work upon ordinary wood a beautiful polish will reward the patient while the constant pressure and repeated movements increase the circulation and are of demonstrable benefit in overcoming the average deformity.

2. Radio-ulnar Joint. Where fibrosis exists which interferes with the movements of pronation and supination, work requiring rotation of the radius upon the ulna is indicated. This motion may be secured by the use of the screw-driver, the gimlet, or the awl. It is well to immobilize the upper arm by grasping it from behind, otherwise the humerus will rotate instead of the radius. If the

patient shows a tendency to rotate the entire body, this may be overcome by having him work in the sitting position.



FIG. 2.—Hand with marked contractures due to brachial plexus injury, ready to be fastened into the wood polishing appliance. The thick felt back protects the palm and fingers. The block beneath, holding the sandpaper, can readily be removed, and fresh sandpaper inserted.

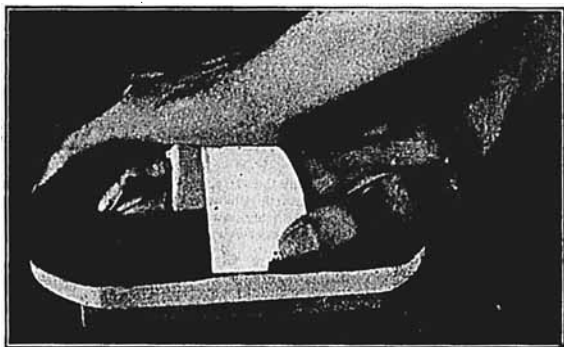


FIG. 3.—The same patient shown engaged in wood polishing. The tight strap over the back of the hand assists in straightening out the deformed fingers, and pressure with the other hand, aided by the to-and-fro motion of polishing, tends to work out the fibrosis and to increase nutrition.

3. Elbow. For limitation of flexion and extension of the elbow, planing and sawing are very satisfactory. Here again the sitting position is best (Fig. 4).

4. Shoulder. For limitation of shoulder movement, wood-chopping or swinging a heavy sledge is valuable. Where the disability prevents this, sweeping movements may be of benefit, and are produced in polishing large surfaces, such as windows or table-tops.

5. Ankle. For fibrosis limiting ankle motion, any apparatus with a treadle like that of the common sewing machine is valuable. Most jig-saws are propelled in this way. To prevent stretching of the anterior tibial muscles, the patient should sit or stand in such a position that the ankle at no time extends beyond 90 degrees. If this cannot be attained by a regulation of the patient's position a thick pad may be inserted beneath the sole as far as the instep. If



FIG. 4.—Sawing is valuable in mobilizing the stiff elbow, and bringing the shoulder muscles into play. The patient, a case of musculospiral paralysis, is shown wearing his wrist-drop splint as he works. The sitting position immobilizes the trunk, so that the work is done entirely with the upper extremity.

there is danger of stretching the muscles supplied by the internal popliteal nerve the heel may be raised by a block and a position assumed which will prevent flexion of the ankle beyond 90 degrees.

6. Knee or Hip. Where fibrosis limits the knee or hip movements a lathe, jig-saw or other machine propelled with pedals, like a bicycle, is valuable. In this case as soon as the knee becomes straighter the seat should be raised higher, so that finally the seat should be so high that the knee must be fully extended to permit the foot to touch the pedal.

For Uncomplicated Paralysis. Here we have the problem of maintaining the nutrition of paralyzed muscles, developing compensatory movements and preventing fibrosis. Carpentry, metal-

work, book-binding, weaving and toy-making have been found particularly useful for accomplishing these objects. Considerable latitude may be exercised in the selection of the occupation, yet the best results will be obtained by choosing work which will call into action such movements as are most like those produced by the paralyzed muscles. Thus compensatory movements will best be developed, the joints most liable to fibrosis will be brought into play and the muscles nearest those which are paralyzed will be exercised.

For Muscles which are Recovering. Finally we are met with the problem of reëducating and recoördinating muscles which are recovering. The best results are here attained by laying stress

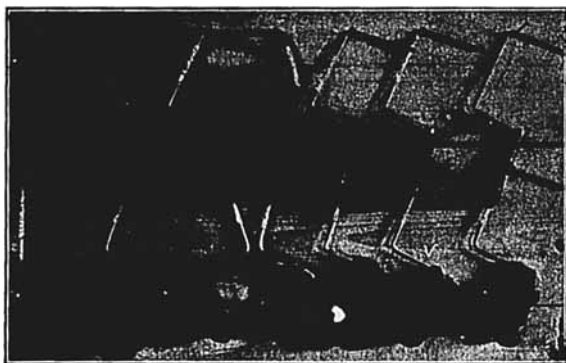


FIG. 5.—Coping saws, used in making toys and puzzles. Each handle is covered with modelling compound containing the impression of a patient's hand. Such saws can be used by patients with deformities and paralyses so severe that they would be unable to hold the ordinary saw.

upon the accuracy of the work done. Musculospiral cases, for instance, who have been doing simple beaten work which requires merely repeated strokes of the hammer upon metal may be given fine beaten work or they may use the carpenter's mallet and chisel.

For pronation and supination, engraving and certain types of wood-carving are valuable.

For flexion and extension of the elbow the coping saw may be substituted for the carpenter's saw and thin material cut into the shape of toys or puzzles (Fig. 5).

For intrinsic hand muscles, type-setting, type-writing, beadwork knitting and penmanship are very valuable.

Conclusions. The advantage which occupational therapy possesses over other forms of mechanical treatment lies in the fact

that interesting work secures repetition of movements without undue fatigue. Not only must the physician take into consideration, therefore, the type of movements produced by the work which he is about to prescribe, but also the desires and interests of the patient.

We found that the soldiers in the hospital took kindly to occupational therapy, and often in spite of their disabilities produced work which from an artistic and technical point of view was of a high order. From a study of these cases over a period of more than a year it became evident that the results of this form of treatment entitle it to an important place among the therapeutic agents at our disposal in the treatment of injuries presenting paralysis, contracture, fibrosis or lack of coördination. In view of the fact that occupational therapy has been proved to be of definite value in the treatment of various other conditions, possibly the day is not far distant when an occupational therapy department, under a trained supervisor, will be recognized as a necessary part of the equipment of every up-to-date hospital.

SOME OBSERVATIONS ON THE USE OF ARSPHENAMIN: ITS EFFECT ON THE KIDNEYS AND ITS THERAPEUTIC RESULTS.

BY HORACE B. ANDERSON, M.D.,
PENNSYLVANIA HOSPITAL, PHILADELPHIA.

RECENT medical literature is pregnant with articles either extolling the virtues of salvarsan and arsphenamin by reporting series of cases in which observations on the clinical manifestations and serologic reactions have indicated the therapeutic value of the drug or abusing and condemning the use of it by reporting all manner of reactions varying from the mild vasomotor disturbances to fatalities. It is the purpose of this paper to do neither the one thing nor the other, but rather to take the opposite ground; to submit some evidence, after studying 39 cases which have had twenty or more doses of arsphenamin, to show the non-toxic effect of the drug on the kidneys when administered in therapeutic doses over a comparatively long period of time and at the same time to give some data concerning its value as a therapeutic agent.

Concerning the gross and histopathologic changes of acute arsphenamin poisoning we have already acquired considerable information from the studies and reports of Kolmer¹ and others, but concerning the chronic poisoning we have less information largely because of the comparatively recent use of the drug. In the future, no doubt,

¹ AM. JOUR. MED. SC., 1920, clx, 188.